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CASES

OF THE

EXCISION OF CARIOUS JOINTS,

BY

PHILIP CRAMPTON, F. R. S.

SURGEON GENERAL TO THE FORCES IN IRELAND, AND SURGEON
IN ORDINARY TO THE KING.

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THE success which in many cases of compound dislocation of the Shoulder, Elbow, and Ankle joints, attended the removal of the protruding extremity of the dislocated bone, led Mr. Park, of Liverpool, to entertain the original idea, that in certain diseases of the joints the excision of the carious extremities of the bones might be attended with similar advantage.

Accordingly, in a case of scrophulous disease of the knee, (commonly called white swelling) Mr. Park extirpated the whole of the joint, “removing somewhat, though not much more than two

inches of the femur, and of the tibia rather more than an inch.”* The operation (which was performed on the 2d of July, 1781, in the Liverpool Infirmary, was attended with the most complete success. “The man lived to make several voyages to sea; he was able to go aloft with considerable agility, and to perform all the duties of a seaman; he was twice shipwrecked, and suffered great hardships, without feeling any further complaint in the limb, and was at last unfortunately drowned by the oversetting of a float in the river Mersey.”†

A few years after the appearance of Mr. Park's pamphlet, Mr. P. F. Moreau published his valuable “Cases of Excision of Carious Joints.” It appears that in the year 1782, (about a year after Mr. Park's publication) Mr. Moreau (the father) in a memoir presented to the Academy of Surgery of Paris, proposed the excision of the carious joint as an operation which, under certain circumstances, might be advantageously substituted for amputation.

In the year 1786 he communicated to the Academy “an account of an operation in which he removed the head of the humerus and the corresponding glenoid cavity of the scapula, which were carious.” “In 1789, he addressed to the same so-

* Park, page 22.

† Ibid. page 57.

ciety a memoir explaining his new method of treating carious joints;" this essay, (says his son) though supported by many facts, met with the most violent opposition; it was found more convenient to deny than to examine the facts on which it was grounded. "This, however," he adds, "did not discourage my father, nor did it stop him in his career. Accordingly, "on the 17th of Sept. 1792, he removed the whole of a carious knee joint from the son of Mr. Clause, apothecary at Chalons-sur-Marne, in the presence of Mr. (now) the Baron Percy, surgeon general to the army of Kellerman, of Mr. Chamerlat, his colleague, and of several other eminent surgeons, both civil and military." The operation seems to have been attended with success, for "three months and a half afterwards the wound was healed, and the limb had acquired a considerable degree of firmness; but the Prussians, in retiring from the French territory, left behind them an epidemic dysentery, which, as is well known, carried off the greater part of those who were attacked by it. It got into the hospital at Bar, of which I had the charge, and was communicated to my patient; he could not bear up against it, and, on the 15th day he died, just three months and a half after the operation."

M. Moreau proceeds to relate several other cases in which the operation of removing the shoulder, elbow, and ankle joints was performed, with complete success, by his father, by Baron

Percy, and by himself, and concludes with the following observation: "It was my wish to show, by the evidence of facts, that the excision of carious joints is, in many cases, a very practicable operation, and one that holds out advantages so unequivocal, that amputation ought to be proscribed in every case where excision may be performed."*

This, I believe, is the amount of the published evidence relating to the excision of carious joints.

After a careful and candid consideration of this evidence, we are naturally led to inquire how it has happened that in an age so distinguished by the extent to which operative surgery has been carried, an operation holding out such advantages, and resting upon such authority, should not have been repeated, *in these countries*, during the forty-five years which have elapsed since the publication of Mr. Park's first operation. Without stopping to resolve a question, which can in no degree affect the merits of the case, I shall simply state the grounds on which I determined to bring the matter to the test of experiment.

In the first place, then, I believe it will not be denied that, if the statements of Mr. Park and Messrs. Moreau be true, if a man from whom the knee joint was removed was able to "go aloft with

* Moreau, page 166.

considerable agility, and perform all the duties of a seaman;" * and if a man, from whom the elbow joint was removed, was able "to do duty as a soldier, to thrash in a barn, and to hold the plough,"† it will not, I say, be denied that the operation is one which is well deserving of a further trial.

But that these statements *were* substantially true, I could not entertain a doubt. There are still, in Liverpool, persons who witnessed Mr. Park's operation and its results; and, with respect to the operations of Messrs. Moreau, many of them are attested by Baron Percy, the head of the army medical department in France, a man who illustrates by his talents, and by his character, the high station which he has filled for so many years. In the year 1814 Baron Percy informed me, that in gun-shot wounds of the joints, he had repeatedly removed the shattered extremities of the bones with the most complete success; and that he had, by this means, saved several limbs which must otherwise have been amputated.

But, in the second place, it appeared to me that there were even stronger grounds for repeating Mr. Park's operation than could be furnished by any single authority, however high or unimpeachable. I mean the astonishing success which is known to

* Park, page 48.

† Moreau page 189.

have attended the removal of the extremities of the long bones when they have been protruded through the soft parts in compound dislocations, to say nothing of the cases of excision of carious joints recorded by White, Bent, and Orred. Both the articulating extremities of the Humerus,* the head of the os Femoris,† the lower extremities of the Tibia and Fibula, together with the Astragalus,‡ have been removed with complete success, and this too under circumstances the least favourable for the success of such operations.

These were the grounds on which I thought myself justified in reviving the operation of Mr. Park. The following cases will show how far the expectations which I had formed as to the benefits to be derived from the practice have been realized.

* White's Cases in Surgery.

† By Wm. White of the Westminster Hospital.

‡ Sir A. Cooper and M. Dupuytren. Sir A. Cooper's testimony in favour of the safety and advantage of removing the extremity of the tibia and fibula in compound dislocation of the ankle joint, is perhaps the strongest that ever was offered in favour of any important operation. "I have known no case of death (says this most experienced and able surgeon) when the extremities of the bones have been sawn off, although I shall have occasion to mention some in which the cases terminated fatally when this had not been done."—*Treatise on Dislocations*, page 276.

CASE I.

Alexander Gordon, 90th regiment, aged 23, was admitted into the Royal Infirmary, Phoenix Park, Dublin, on the 2d of January, 1823. To avoid the description of appearances, with which every medical man is but too familiar, it may perhaps be sufficient to state, that it would be difficult to find an individual in whom the "scrophulous aspect" was more distinctly marked. He was sent to the General Hospital on account of true scrophulous white swelling of the right elbow joint. The disease was of about ten months standing; the swelling extended at least a hand's breadth above and below the joint; suppuration had taken place over the inner condyle of the humerus, and the opening had degenerated into a large and irregular ulcer, at the bottom of which the bone could be felt in a state of caries. The man's general health was much impaired, his pulse was 120, and feeble; he had night perspirations, and, in a word, was far advanced in hectic fever. It was determined in consultation that the only chance of preserving his life was by sacrificing the limb, and he was sent into the General Hospital in order that the operation might be performed. I thought this was a fair case for performing Mr. Park's operation, and having obtained the man's consent, (who declared "that he would willingly

suffer any pain or risk for the chance of saving his right arm,") the operation was performed on the 4th of Feb. in the presence of the greater number of the principal surgeons, both civil and military, of Dublin. The patient was placed (as recommended by M. Moreau) upon his belly on a table covered with a mattress, and pillows so arranged as to make his posture as little inconvenient as possible ; the diseased arm hung over the edge of the table, presenting its posterior and inner surface to the operator ; the brachial artery being compressed by an assistant, an incision was now made along the spine of the inner condyle, commencing about four inches above, and terminating about two inches below, its tuberosity. This incision passed through the centre of the ulceration, and laid bare the ulnar nerve, which was carefully raised from its groove, and drawn to the inner side of the incision.† A similar incision, parallel to the first, was made on the outer side of the humerus, and then a transverse section, which cut through the tendon of the triceps muscle, immediately above its insertion into the olecranon, connected the two longitudinal incisions, so that the wound represented pretty accurately the letter H ; the lateral incisions, however, being slightly incurvated, so as to follow the bend which the fore-arm made with the arm. The

† From neglecting this precaution in M. Moreau's case, the ulnar nerve was cut across, and the ring and little finger were deprived of the powers of motion.

upper flap, consisting of the lower extremity of the triceps muscle, the thickened and diseased cellular substance, and integuments, was raised from the flat surface of the humerus, to which it had a very slight attachment; the lower flap was separated in the same manner, so as to lay bare the upper extremity of the ulna and radius; the scalpel laid on its flat was now pushed between the flexor muscles and the bone on its anterior surface, at the distance of three inches above the tuberosity of the inner condyle, and retained in this situation by an assistant. The saw was then applied, and the bone was divided immediately over the flat surface of the knife which served as a protection to the muscles beneath. The separated portion of the humerus was now raised with the utmost ease by the finger and thumb of the left hand, while the capsular and lateral ligaments, degenerated to the state of a lax cellular substance, were separated by running the knife round the condyles, keeping the edge as closely as possible to the bone.* The lower extremity of the humerus being removed, the articulating surfaces of the radius and ulna were completely exposed; but, with the exception of the cartilage which covers the olecranon, (which was partially eroded,) every thing appeared sound. The olecranon was now removed, and the wound was spunged out; as there was no bleeding which rendered it necessary to have recourse to a ligature, the flaps were laid down, and secured

* See plate VIII.

to each other by four points of suture. The fore-arm was placed at a right angle with the arm; the wound was covered with pledgets of lint wetted with spirits and water, and the man was laid in bed, with the arm supported on a suitable pillow.

He passed the night remarkably well. Suppuration, attended with a very slight degree of symptomatic fever, set in on the fourth day; but, so favourably did every thing proceed, that on the 9th day he sat up in his chair, the arm being supported in a tin case, which I had constructed for the purpose. The wound however was slow in healing, no doubt from the bad constitution of the patient; I sent him therefore to the sea side five weeks after the operation, and there he recovered so rapidly, that on the following week he walked into town to see me, a distance of nearly five miles. He continued to reside at the sea side for three months, walking into town and returning on the same day once a week. On the 18th of September he returned to the King's Infirmary, in order to pass the board of general officers at the Royal Hospital for his discharge. At this time the wound, with the exception of a small superficial ulceration about the place which had been occupied by the inner condyle, was completely closed; the arm, when allowed to hang by the side, retained nearly a semi-flexed position, but by a voluntary effort he was able to give a slight degree of flexion to the fore-arm, so as to lessen

the angle which it formed with the arm. He had the use of the fingers, so as to be able to use his knife and spoon; and on the 27th of Nov. 1823, *he signed his own discharge with the right hand.* While waiting in the hospital for a party, with which he meant to march to his native county in the north of Ireland, a large abscess began to form on the loins. Before he left the house it had acquired the size of a twopenny loaf: he marched however with the party, and I have heard nothing of him since that time. It is scarcely necessary to observe, that the occurrence of a scrophulous abscess in the loins could have no sort of connection with the operation; and that so far from throwing any discredit upon it, it seems to shew that, even in a constitution so decidedly bad, the operation may be performed with safety and advantage.

The success which attended this operation naturally led me to extend it to a case of greater difficulty; accordingly, on the 7th of May 1823, I performed the operation of removing the knee joint in the case of Susan Conolly, a patient in the County of Dublin Infirmary.

The particulars of this case are extracted from the hospital book into which it was entered by the resident pupil.

CASE II.

EXCISION OF THE KNEE JOINT.

Susan Conolly, æt. 23, of a strumous habit and emaciated appearance, marked by several scars of scrophulous ulceration, some of which are still open on the left hand and arm. The right knee is considerably enlarged, of an irregular shape, projecting much to the inner side over the head of the tibia, and measuring three inches and a half more than the sound knee, the surface smooth, white, and shining, but marked by the ramifications of large blue veins. Severe pain much increased by pressure, or by the slightest motion is felt through the joint ; a small ulceration under the inner hamstring discharges a great deal of thin greenish coloured matter ; the joint is permanently contracted, the leg forming a very acute angle with the thigh ; pulse 96, and feeble ; skin rather hot ; tongue white with red edges ; appetite bad ; tendency to diarrhæa ; gets but little rest, from the pain of the limb ; catamenia not present for the last two years. Disease commenced about twelve months ago ; but the contraction of the joint, the severe pain, and the alteration of her health are but of six months standing. The usual treatment had been adopted, but without even temporary relief, for the last six weeks she has had regular attacks of hectic fever, accompanied with profuse

perspirations and diarrhœa, which even opium does not control.

Having stated to my colleagues the grounds on which I proposed to substitute excision of the joint, in this case, for amputation, and obtained their concurrence, I proceeded to perform the operation in the following manner. An incision, commencing about three inches above the outer condyle, and a little below the axis of the femur, was continued to about an inch below the head of the fibula. The acute angle, which the leg formed with the thigh, necessarily gave to this incision the form of a crescent. In making the incision the knife was carried down to the bone; a similar incision was made on the inner side of the joint. The lateral incisions were united by a transverse cut carried below the patella. The flap, thus formed, was raised by a rapid dissection, and the cavity of the joint was completely exposed: for the extent of more than three inches above the condyles the femur was without periosteum, the purulent matter lying in contact with the naked bone. At the point where the periosteum appeared to be united with the bone, the saw was applied, and the bone was divided, the soft parts being protected by a spatula which was passed between the muscles and the bone. The separated portion of the femur was now dissected out, and so slight were its connections with the soft parts that this part of the operation, which I expected would have been attended with

some difficulty, was effected with the greatest ease. The articulating surface of the tibia was now fully exposed ; it was totally deprived of cartilage, and was in a state of caries. By means of a strong and short knife, such as is used by shoe-makers, I was enabled to pare away about half an inch of the head of the tibia, the cancelli of which were loaded with a lardaceous matter, and with pus.

The cavity of this great wound was now sponged out, when upon minutely examining the cut surface of the Femur, I found that the cancelli were diseased and filled with pus, and that posteriorly the periosteum was detached from the bone.* I therefore sawed off about an inch and a quarter more of the femur. On placing the extremities of the femur and tibia in contact, the flap, containing the patella, was found to be about three inches too long, and as the patella itself was totally deprived of its cartilage, and in a state of caries;† the exceeding portion of the flap, including the patella, was removed by a transverse incision. No artery was divided which required the application of a ligature. The flap was retained in its position by two points of the interrupted suture, and compresses wetted in spirits and water were laid over the wound. The limb was now placed in position in one of Assellini's, " carry-

• See plate IX.

† See plate IX.

ing splints'' which had previously been carefully adapted to the size and length of the limb, it extended from above the trochanter major on the outside, and from the ramus of the pubis on the inside, to about four inches below the foot, it was supplied with a sole piece, which supported the foot, and was carefully padded with a mixture of baked hair, and wool.

The woman bore the operation, which was by no means tedious, with great fortitude; and indeed, when it is considered that very little muscular structure, and no large nerves or blood-vessels were divided, it is probable that the pain was much less than is attendant upon an amputation of the thigh. However this may be, it is certain that the operation was succeeded by but little constitutional disturbance, and, to the great surprise of every one who witnessed the progress of the case, this great wound united by the first intention, and was healed in less than three weeks. The patient's health continued to amend rapidly until the 12th of September—when she had a rigor which ushered in an attack of Erysipelas that affected the leg and thigh. I may observe (in passing) that Erysipelas was, at that time, prevalent to an unusual degree in the Meath Hospital, and in all the hospitals in Dublin. The Erysipelas, however, was succeeded by abscess, which burst through the

old sinus in the ham, and continued to discharge for three or four weeks, and then healed. The woman's health, which had greatly declined during the formation of this abscess, began to amend as soon as it had ceased to discharge; and, in the month of November she was able to go about the hospital, the limb being supported by a splint, so constructed that the weight of the body was thrown on the tuberosity of the ischum. No degree of union, however, had taken place between the bones; and while she remained in hospital she suffered two or three attacks of Erysipelas, much slighter however than the first, but each of which terminated in the formation of matter, which escaped, either through the old sinus, or through a small aperture which was formed in the anterior and upper part of the cicatrix. She was discharged from the hospital on the 27th of June 1824, in very good health; but no bony union had taken place between the Femur and Tibia. In the winter of 1825-6, hearing that her health had very much declined, and that she was living in great poverty, in a damp cabin in the country, I had her brought up to town, and she was re-admitted into the hospital.

She was now in a wretched state of health; she had suffered repeated attacks of hæmoptoe, and had cough, with purulent, expectoration, and night sweats. She had no pain in the limb, but there was a general thickening about the joint, as

if the disease had been reproduced, and the sinus in the ham continued to discharge a thin whey coloured matter. By suitable attention her health again rallied, and she returned to the country in the month of May 1826. Shortly after her return I was informed that her health again declined, and that she died some time in the month of July 1826, just three years and two months after the operation.

OBSERVATIONS.

It is plain that this operation, so far at least as related to the preservation of the uses of the limb completely failed. It served to prove, however, in the most satisfactory manner, that the excision, even of so large an Articulation as the knee joint, might be performed with safety, and gave strong grounds to hope that, under more favourable circumstances, the operation might be attended with success.

An examination of the excised joint, which is now deposited in the Museum of the Royal College of Surgeons (marked No. 77),* will at once enable us to explain the cause of the failure of union in this case.

* See plate IX.

It is obvious that the posterior part of the Femur, above the condyles, is in a state of necrosis. . It is deprived of periosteum ; the walls are as thin as card paper, and the medullary cells are loaded with pus : in a word, the case was one to which the operation of excision was not applicable. The disease had proceeded too far ; for, even had it been possible to have removed the whole of the diseased bone, and that union had taken place between the femur and the tibia, the limb, from its shortness, would have been useless. Add to this, that the highly scrophulous constitution of the patient, as evinced by the open sores on the hand, and ultimately by the disease of the lungs, was, in the highest degree unfavorable to the restoration of the healthy action in the constitution, and in the part which was essential to the reunion of the bones.

For nearly four months after the operation, every thing, (at least as far as related to the restoration of the patient's health,) looked as favourably as could be desired. The wound was healed, but no union had taken place between the bones. I was so fully convinced that this was to be accounted for by the bad constitution of the patient, and the diseased state of the bones, that I determined to repeat the operation, in a case where the health was less impaired, and where, from the case being more recent, the disease of the bone was likely to be less extensive. A case of this kind occurred in the month of August, 1823 ;

and my colleagues shared with me in the hope, which has since been so happily realised, that the operation might here be performed with a reasonable prospect of success.

CASE III.

EXTRACTED FROM THE HOSPITAL BOOK.

Anne Lynch, æt. 22, a strong, and remarkably good-looking country girl, with dark hair blue eyes, and sallow complexion, but presenting no peculiar character of a strumous habit, was admitted into the Meath Hospital, on the 3d of May, 1823. About four years ago, she was seized with a sudden and severe pain in the right arm. The pain soon left the arm and settled in the right knee, which, from that time continued to be, more or less, affected with severe pain, principally confined to the inner condyle. The pain was much increased by pressure on either condyle, by the slightest motion, and by the heat of the bed, at night. The joint became perfectly stiff, and a good deal contracted, so that she could only touch the ground with her toe when standing on the left leg; and the swelling, which for the first few months was inconsiderable, gradually increased, and is now of a very great size, globular in its form, elastic to the touch, of a dusky red colour towards the inner side, and the surface intersected by numerous and large blue veins. She describes the pain as being ex-

cruciating, particularly at night time. Within the last two months symptoms of hectic fever have manifested themselves, but upon the whole her appearance is not very unhealthy. She has lost but little flesh, and the treatment, both local and constitutional, to which she has been subjected since her admission into hospital, has abated the pain, and improved her general health.

The poor girl, who came into the hospital with the intention of submitting to amputation, expressed a desire that an operation, such as had been performed upon Connolly, (with whom she was well acquainted,) should be performed upon her; for up to this period, it is to be observed, that every thing had proceeded, in Connolly's case, in the most favourable manner. She had left her bed, and was wheeled about the passages of the house in a little chair constructed for the purpose.

On the 4th of August the operation was performed, as in the case of Connolly, with this difference, that the poor girl who, in coming into the operating-room, exhibited the greatest fortitude, and even cheerfulness, on the instant that the knife was applied to the skin, became so ungovernable that four strong assistants could, with the utmost difficulty, retain her upon the table. This necessarily prolonged the operation, and no doubt very much increased its severity. The removal of the divided extremity of the femur, which,

in the case of Connolly, was effected with the utmost ease, in perhaps less than a minute, was here rendered a work of infinite difficulty and danger, as when the knife was passing between the popliteal artery and the bone, and actually in contact with the former, no entreaty could induce the poor girl, whom terror seemed to have deprived of her reason, to remain for one moment at rest, she struggled so violently with both limbs, that it was with a degree of labour and anxiety, such as I had never before experienced, that I at length succeeded in passing the edge of the knife round the condyles posteriorly, and thus detaching the divided extremity of the femur. The patella, which was carious, was removed with the lower portion of the flap, as in the case of Connolly,* but the articulating cartilage of the Tibia appeared to be sound : I pared away the greater part of it, however, and removed the semilunar cartilages, of which only the inner one exhibited any marks of disease.

The treatment was conducted in all respects, as in the case of Connolly, with this difference, that I was obliged to resort to a variety of contrivances to keep the limb in position. The same unmanageable disposition, which caused so much embarrassment during the operation, greatly interfered with her recovery. Nothing could induce her to remain for one moment in any position which she found was attended with inconvenience ; the consequence of these constant

* See plate X.

changes of position was, that the extremity of the femur was often protruded through the wound. Notwithstanding all this, and the occurrence of a large sloughy sore on the buttock, in consequence of an insufficient attention upon her part to cleanliness, her general health was but little impaired: a small exfoliation took place from the extremity of the femur, and in about two months she was removed from her bed to a chair. In about four weeks after the exfoliation of the femur, the wound was completely healed, and the limb had acquired a considerable degree of firmness. About six months after the operation the femur and tibia were consolidated by a firm bony union, and the woman, though timid beyond all example, began to lay her foot gently to the ground, supporting the weight of her body, however, on crutches. She now went to the country, and in the month of October, 1824, I received a letter from my friend and pupil, Mr. Rynd, of which the following is an extract:—

“ Your old patient, Anne Lynch, *walked* from Kilcock to Johnstown house (a distance of nearly five miles) to see me this morning. She is in excellent health, and the limb is perfectly firm, though bowed outwards.” Anne Lynch has been frequently in Dublin since that period, and has presented herself for examination at most of the hospitals. She is now in town; and I have this day, Nov. 3, 1826, examined the limb, and find that the femur and tibia are firmly consolidated: the leg and thigh are not in the slightest degree wasted,

but the limb is considerably bowed outwards. She wears a shoe with a cork sole, four inches thick ; and, to use her own expression, “ is able to stand or walk the length of a day.”

It would extend this paper far beyond the limits, and indeed beyond the design, of an Hospital Report, if I were to dwell upon the reflections whether of a pathological or of a practical nature, to which these cases naturally give rise. There are, however, two or three circumstances to which I trust I may be permitted briefly to advert, not only as they serve to illustrate some of the most refined and interesting principles of the animal economy, but as they are pregnant with practical inference.

First, then, it is impossible not to be struck by the fact, that the constitutional disturbance succeeding to the excision of even so large an articulation as the knee joint, bore no comparison, in kind or in degree, with that which experience has proved to be the invariable attendant upon simple penetrating wounds of a joint, when union is not effected by the first intention. This difference in the symptoms may, I think, be referred to that well known principle of the animal economy, which disposes the system generally, to suffer in proportion as the injured part is possessed of a higher or a lower degree of sensibility, and as the injury is more or less difficult of cure by the proper forces of the constitution.

Now although it be true that when in a healthy state, the parts which enter into the composition of a joint are possessed of but a low degree of sensibility, still it is well known that when suffering under disease, there are no parts in which inflammation is attended with more exquisite pain, or in which the actions which tend to recovery are more slowly or imperfectly performed.

It is not surprising, therefore, that a penetrating wound of a large articulation should be succeeded by a train of the most painful and dangerous symptoms. By the total excision of the joint, however, all those parts which, when diseased, influence the constitution so unfavorably, are removed from the system, and the injury is resolved into a case of a clean incised wound with a divided but not fractured or diseased bone at the bottom of it.

Secondly, it is well known that after amputation of the thigh, the extremity of the divided bone, not only does not expand, but in the course of a very few weeks becomes conical. In the case of Lynch, on the contrary, the extremity of the Femur has thrown out a quantity of bony matter, which equals in size, and somewhat resembles in figure, the condyles which were removed : an effort of nature, which it is impossible to contemplate without admiration, and which might seem to supply the zealous disciples of the

Hunterian school with the strongest possible illustration of their favourite doctrine, Concerning "*the wise councils of the constitution.*"* But this doctrine, however, captivating, can scarcely be maintained, founded as it is on the unphilosophical substitution of *final* for *efficient* causes. That the process which we have just noticed is the result of "wise councils" is certain, but for those councils we must look farther; we must extend our view beyond the operation of any independent *deliberative* principle resident in the constitution, and we shall find that the fact may be ranged among the many other manifestations of that unity and simplicity of design which pervades the universe, and which, acting by *general laws*, still provides against every conceivable contingency, bringing order out of disorder, and reparation out of injury or decay. Thus, according to an *original law*, parts which are no longer of use to the system are gradually removed by the process of absorption, and this process is hastened by a certain degree of irritation communicated to the surrounding parts; accordingly the *useless* and *irritating* extremity of a fractured or amputated bone is, in ordinary cases, removed, by the absorbents of the surrounding soft parts.

But, concurrent with this, there is another law of the animal economy which provides for the for-

* Hunter on the blood, *passim*.

mation, growth, and reparation of the various parts of the system. This law provides, that each formative part should have determinate functions ; some parts, for example, to form and repair bone ; some to form and repair ligament, and some, muscle ; and all this with such nice adjustment, that in a state of health each part, as it grows, preserves its original form and just proportions ; nor is the course of this *general law* disturbed by the accidents to which the animal frame is liable ; but, on the contrary, their immediate effect is in general to bring it into more active operation ; so that the injury becomes, in a manner the *efficient cause* of its own reparation. The irritation (for example) which is excited in the Periosteum and the surrounding soft parts by the sharp splinters of a broken bone, and by the external violence by which the injury was inflicted, excites an encreased action in the vessels whose determinate function it is to secrete bone, and the consequence is, the abundant supply of the bony matter by which the fracture is to be repaired. If this injury should occur in the shaft of a bone, the injury is repaired by parts, whose determinate function it is to form and repair only the shaft ; if, in the extremity, by parts whose determinate function it is to form and repair only the extremity.

It appears to me, that by a reference to these principles we can, without the introduction of a

deliberative principle, resident in the bone or Periosteum, sufficiently comprehend how it happens that, in the case of *amputation of the thigh*, the sharp edges of the truncated bone are removed by the process of absorption ; while, in the case of *excision of the knee joint*, an attempt, however imperfect, is made to restore the condyles.

For the more extended and perfect operation of these principles of reparation we must look to those classes of animals which (with reference to their organization) are, perhaps, not correctly termed “lower ;” we shall there find, that a whole limb,* an eye,† or even the head itself,‡ may be perfectly restored ; and it is probable that we are still but imperfectly informed as to the limits of the reparative power of nature in other animals, or even in man.§

Upon the practical inferences which may be

* As in lobsters, crabs, and perhaps all insects.

† As in the water newt. Spallanzani's Tracts.

‡ As in the snail. Ibid.

§ In the admirable and perfectly well authenticated case of Edmond Pollet, related by Mr. White in the Transactions of the Royal Society, 1769, “the head of the os humeri was sawn off,” and yet the entire motion of the limb was preserved, by the formation of a new joint.” See also a case of excision of the head of the humerus, by that excellent surgeon, Mr. Syme of Edinburgh, in the Edinburgh Medical and Surgical Journal, No. 88.

drawn from these operations I shall be more brief. Without venturing to define the cases in which excision of the joint is to be preferred to amputation of the limb ; I think I may venture to predict, that if I should be so fortunate as to direct the attention of the profession to the subject, a great number of limbs will be preserved, which otherwise would have been sacrificed ; and that, before long, in the *generality* of incurable accidents, and diseases of the shoulder, elbow and ankle joints, excision of the joint will be preferred to amputation of the limb ; and, even in the knee, the operation of excision will *sometimes* be considered more eligible than amputation of the thigh.

Should the cases which I have communicated in any degree contribute to so important a result, I shall, among many other sources of gratification, feel peculiar pleasure in the reflection that they may be the means of rendering that justice to the talents and to the integrity of Mr. Park, which has been too long withheld, but to which, both as a surgeon and as a man, he is so eminently entitled.

P. S. I would just observe, that were I to repeat the operation of excision of the knee-joint, I should adopt a different mode of operating from that which I employed in the cases of Connolly and Lynch.

I am satisfied, from repeated trials upon the dead subject, that the operation can be most safely and rapidly executed by separating the condyles from all their attachments, previously to sawing the bone ; as soon, therefore, as the flap containing the patella is turned upwards, the edge of the knife should be carried round the condyles, close to the bone, so as to divide *all* the ligaments which connect the femur with the tibia ; the tibia can then with great ease be pushed backwards, and as much of the projecting condyles can be removed as the operator may think necessary.

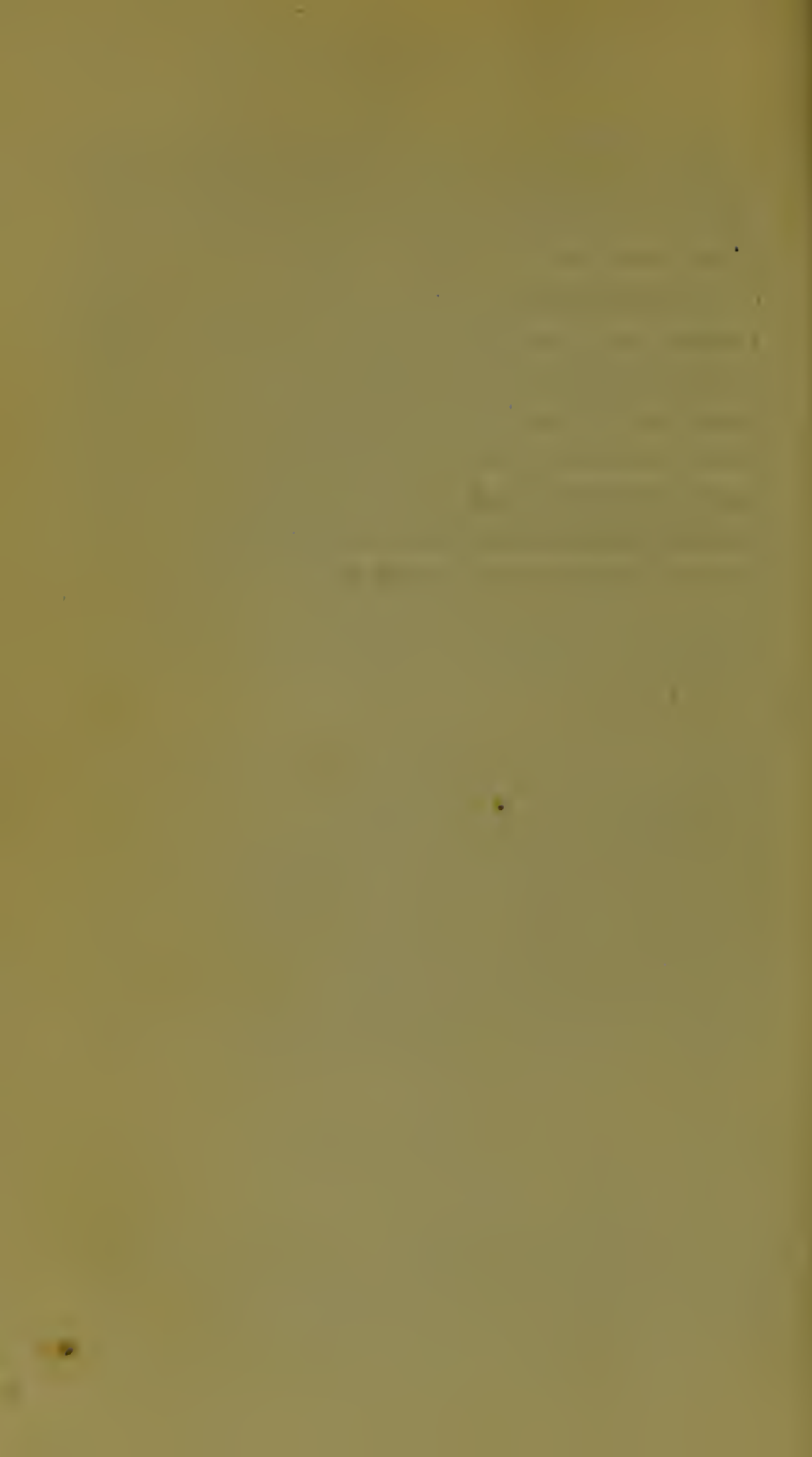
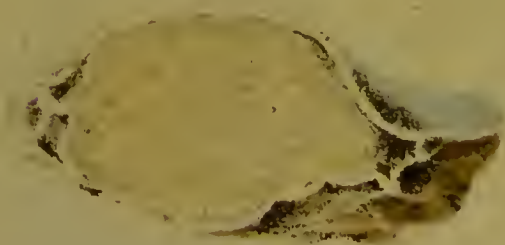


Fig 1



B

Fig 2





